

TRANSLATION  
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[JP,10-207441,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF  
THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF  
DRAWINGS DRAWINGS

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the cursor display control which controls the display of the cursor indicating a location on the screen of displays, such as a computer.

[0002]

[Description of the Prior Art] In actuation of a current computing system, a wait with the big actuation for which cursor is moved to the location of the request on a screen using a pointing device is occupied by improvement in a graphic user interface. for example, the cursor interlocked with a pointing device and it with various gestalten, such as actuation of choosing the icon by mouse click etc., and specifying with cursor the actuation to which cursor is moved on an icon and the icon is moved with cursor, and an alphabetic character input part, was used, and the man machine interface boiled it markedly and improved.

[0003] Hereafter, the structure of the conventional cursor display is explained briefly. First, generally a pointing device outputs the two-dimensional amount of displacement by actuation of a user corresponding to a screen. Taking the case of a mouse, it explains as a pointing device. the 2-way (it considers as the direction of X, and the direction of Y.) which intersects perpendicularly by rotation of the ball prepared in the mouse inferior surface of tongue etc. if a mouse is moved on pinacoid -- the variation rate which boils, respectively and can be set -- an amount is outputted. This amount of displacement is inputted into the central processing unit (CPU:CentralProcessing Unit) of the computer to which the mouse was connected. CPU functions as a cursor display control by performing a cursor display-control processing program.

[0004] Drawing 3 is the processing flow Fig. showing the outline of the conventional cursor display-control processing. a cursor display control -- the above from a pointing device -- a variation rate -- an amount is inputted. The amount of displacement of the direction of X and the amount of displacement of the direction of Y are added to the X coordinate and Y coordinate showing a current cursor display position, respectively, and the new cursor display position which a pointing device specifies by this is determined

(S100).

[0005] There is a configuration (pattern), which changes with the location on a screen and processing states of a computer in cursor. For example, with the attribute of the window of the application with which cursor was positioned, and the attribute of an object, the configuration serves as an "I" mold, or serves as an arrow head. Moreover, a computer is processing, and when a user is a waiting state, the mark of a sandglass is displayed as cursor. These cursor patterns are prepared by the operating system (OS:Operating System) or the application program. A cursor display control chooses the cursor pattern specified by OS etc. to the cursor display position for which it asked by processing S100, and the cursor pattern according to the processing state of a computer (S110).

[0006] Each cursor pattern is expressed with the set of a two-dimensional dot, and a cursor display control more specifically asks for the address of the storage region which stores the data which express the dot concerned the location of each dot of a cursor pattern, and on [, such as a frame buffer, ] the memory which stores an image based on a cursor display position. And the address is specified and each dot data are made to output and store in a frame buffer (S120). The data showing a screen of each dot are stored in the frame buffer, and a cursor image and other image images are compounded by writing in the image data of the cursor corresponding to a cursor pattern here. An indicating equipment displays by specifying the address in the sequence according to the beam scan of a cathode-ray tube (CRT:Cathode-Ray Tube), and reading data from a frame buffer.

[0007] If a cursor display control has the next input from a pointing device, it will repeat the same processing (S130). Since the amount of displacement is outputted a short period, even if it moves a mouse comparatively quickly, on a screen, cursor follows in footsteps of migration [ a mouse ] and is continuously expressed as the mouse most generally as a pointing device used. If cursor is caught on a screen, since it becomes easy for a user to follow migration of cursor by the eye, that is, it will be hard to miss cursor and he will once become henceforth by this, the outstanding man machine interface is realized.

[0008]

[Problem(s) to be Solved by the Invention] Now, the resolution of a display can be provided with the high-definition image displayed minutely from the thing of about 480 pixels of 640 pixel x perpendiculars of horizontals, for example, there is a thing of various classes to the thing of high resolutions, such as 1024 pixels of 1280 pixel x perpendiculars of horizontals and 2048 pixels of 2048 pixel x perpendiculars of horizontals, in it.

[0009] In the conventional cursor display, especially the difference in the resolution of this display was not taken into consideration. That is, in the conventional cursor display control, like the above-mentioned processing S110, although the suitable cursor pattern was chosen according to the difference in the attribute of a cursor display position, or the processing state of a computer, the thing with this cursor pattern same regardless of the resolution of a display was used. Especially the number of the dots, which form, the size, i.e., the cursor pattern, of cursor, was [ that there is nothing ] fixed with respect to the resolution and magnitude of a screen. For example, as an OS of the computer for personal computing, by current and Windows ("Windows" is the trademark of U.S. Microsoft Corp.) whose number is one although it has spread most, the pattern of the magnitude of

a maximum of 32 dots of each every direction was offered as cursor, and every display showed this cursor pattern as it was.

[0010] However, although it is magnitude sufficient in the resolution of 480 pixels of 640 pixel x perpendiculars of horizontals since cursor is horizontal 1/20 of a screen for a user to find it easily on a display when it explains taking the case of the magnitude of the cursor of Above Windows, there is nothing 1/64 with cursor horizontal in the resolution of 2048 pixels of 2048 pixel x perpendiculars of horizontals. Moreover, the screen size of the display of high resolution is also large generally. For example, the indicating equipment of 2048 pixels of 2048 pixel x perpendiculars of horizontals has a big screen called a 28 inch display. Thus, if a screen size becomes large, in the distance of the user and display in the case of operating a computer, a user cannot usually catch the whole screen within the visual field.

[0011] That is, in the conventional cursor display control, a user could not recognize the location of the cursor on a screen easily due to the reason the relative magnitude of the cursor to a screen falls in the first place, and the reason the range which a user can check [ second ] by looking at once by expansion of a screen size becomes small, and there was a trouble of becoming easy to miss, so that the resolution of a display was high.

[0012] When cursor is missed conventionally, a user moves a mouse to unconscious quickly halfway, and it tries to find out cursor. It is because that from which this reason moves to one on the stationary image is conspicuous, and even if it is the case where the image used as the background of cursor follows a motion on one more, it is thought that the motion interlocked with mouse actuation of it is because it is easy to recognize.

However, when the display became high resolution and the size of cursor became small relatively, the problem that it was not fully demonstrated had the effectiveness of prehension of the cursor by such approach.

[0013] It was made in order that this invention might cancel the above-mentioned trouble, and it aims at offering the cursor display control makes cursor hard to be able to check the location of cursor by looking easily and quickly and to miss, and a user raises a man machine interface also especially in the display of high resolution.

[0014]

[Means for Solving the Problem] The cursor display control concerning this invention asks for the pointing location on an indicating-equipment screen based on the input from a pointing device, is the cursor controller which displays cursor on the pointing location concerned, and has a signal detection means detect the predetermined signal actuation performed by the pointing device operator, and a display emphasis processing means will emphasize and display said cursor if said signal actuation is detected.

→ [0015] If according to this equipment predetermined signal actuation is performed when those who operate the pointing device connected to the calculating machine etc., i.e., a user, miss cursor, this will be detected by the signal actuation detection means. Then, it makes cursor easy for a display emphasis processing means to make the display of the cursor on the screen of a display emphasize, and to check by looking to a user.

[0016] the cursor display control concerning this invention -- continuous -- a variation rate -- the variation rate concerned from said pointing device which outputs an amount -- it has a cursor advance rate decision means to ask for the passing speed of said cursor based on an amount, and said signal detection means is characterized by detecting said  
→ signal actuation which used change of said passing speed at least.

[0017] According to this invention, the passing speed of cursor is calculated from the amount of displacement continuously outputted every moment from pointing devices, such as a mouse and a trackball, and the combination of actuation of the pointing device by the user who brings about change of this passing speed, or this and actuation of other classes is used as signal actuation detected by the signal detection means.

[0018] ~~It detects that the suitable mode of this invention exceeded the rate threshold predetermined [ means / said / signal detection ] in said passing speed as said signal actuation. In this invention, when the average of momentary passing speed or passing speed exceeds a rate threshold, the display of cursor is emphasized.~~

[0019] ~~Said display emphasis processing means expands the display size of said cursor, and the suitable mode of this invention performs said emphasis. Said display emphasis processing means displays said cursor with the complementary color of the background color of the cursor concerned, and the suitable mode of this invention performs said emphasis. Said display emphasis processing means expands the brightness difference around said cursor and cursor concerned, and another suitable mode of this invention performs said emphasis.~~

[0020]

[Embodiment of the Invention] Next, the operation gestalt of this invention is explained with reference to a drawing.

[0021] [Operation gestalt 1] drawing 1 is the block diagram of an outline showing the configuration of the calculating machine concerning this operation gestalt. As for this calculating machine, CPU2 performs the communication link with a peripheral device through a system bus 4. A mouse 8 is connected to CPU2 through a system bus 4 and the mouse interface 6, and CRT display 12 is connected to it through the system bus 4, the frame buffer, and the video generator 10. That is, this computer system was equipped with the configuration which consists of a mouse 8 and a mouse interface 6 as a pointing device, and, on the other hand, is equipped with the configuration which consists of a frame buffer and a video generator 10, and CRT display 12 as an indicating equipment.

[0022] If a mouse 8 is moved on pinacoid, the encoder in a mouse will generate the pulse of the number according to the rotation of the ball prepared in the mouse inferior surface of tongue, for example. The mouse interface 6 counts this pulse, for example, changes the number of counts in the meantime into digital data for every fixed time interval, and transmits it to CPU2 as an amount of displacement of a mouse. this variation rate -- an amount -- the former -- the same -- a two-dimensional variation rate -- the variation rate of the direction of X respectively corresponding to [ are an amount and ] the level of a screen, and a perpendicular direction -- an amount and the variation rate of the direction of Y -- it is expressed with two components called an amount.

[0023] CPU2 functions as a cursor display control by performing a cursor display-control processing program. A cursor display-control processing program processes based on the amount of displacement from a mouse 8, and outputs a cursor image data, i.e., the data of each pixel which constitutes cursor, to a frame buffer and a video generator 10. The cursor image data outputted from this CPU2 specifically consists of the address on the frame buffer corresponding to a pixel, and a pixel value for example, of the RGB value in this pixel. The pixel value of each pixel which constitutes the screen of a display is stored in the frame buffer, and cursor is compounded on the image with which the window which an application program etc. offers is displayed by writing in the pixel image data

which CPU2 outputs to this. A video generator reads data from this frame buffer in order of the predetermined address, generates a video signal, and supplies it to CRT display 12.

- [0024] Drawing 2 is the processing flow Fig. showing the outline of cursor display-control processing of this operation gestalt. The amount of displacement from the mouse interface 6 is inputted into CPU2, which is a cursor display control, and it calculates the location of cursor, and passing speed based on the amount of displacement (S200). The location of the migration place of cursor is determined by adding the amount of displacement of the direction of X, and the amount of displacement of the direction of Y to the X coordinate and Y coordinate showing a current cursor display position as usual, respectively. On the other hand, it can be considered that the amount of displacement of the mouse 8 in the round term itself is the passing speed of cursor, without doing a division with a time interval anew, since the amount of displacement is proportional to passing speed if the output of the amount of displacement from the mouse interface 6 is performed with a fixed time interval about passing speed. Moreover, when the output period of the amount of displacement is not fixed, let the value, which did the division of the amount of displacement from the mouse interface 6 with the corresponding time interval be passing speed. Thus, CPU2 functions as a cursor advance rate decision means.
- [0025] Cursor display-control processing chooses next the cursor pattern according to the location of the migration place of the cursor for which it asked by processing S200, and the processing state of a computer (S210). This is the same processing as usual.
- [0026] If a cursor pattern is chosen, CPU2 will judge next whether predetermined signal actuation it is supposed that is carried out when a user misses cursor is performed. With this operation gestalt, it is set up as this signal actuation that the mouse 8 is moved quickly, and it judges whether CPU2 is beyond a rate threshold predetermined in a cursor advance rate as a signal actuation detection means (S220). For example, a rate threshold is set [ second ] up in about hundreds-1000 dots /.
- [0027] It is judged that the user will perform signal actuation if a cursor advance rate is beyond a rate threshold, and on the other hand, if it is under a rate threshold, it will be judged that signal actuation is not performed.
- [0028] When it is judged that signal actuation is not performed, the usual cursor pattern chosen by processing S210 is changed into a cursor image data as it is as usual, and is outputted to a frame buffer (S230).
- [0029] On the other hand, when signal actuation is detected, in case the cursor pattern chosen by processing S210 is changed into a cursor image data in the signal detection processing S220, display emphasis processing is performed (S240). With this operation gestalt, this display emphasis processing is processing in which a display size is expanded without changing the location to which cursor points, i.e., the center position of a cursor pattern. And the cursor image data changed so that a display size might be expanded is outputted to a frame buffer (S250). If the dilation ratio of cursor size is too close to 1, the display enhancement effect of cursor will become low and the effectiveness of the improvement in visibility of cursor will become small. On the other hand, when a dilation ratio is too large, there is a fault, which actually makes the center position hard to be offensive to the eye for a user, and to grasp. Therefore, probably, for example, cursor size will be good to be expanded to about twice compared with the usual size.
- [0030] The above is a series of cursor display-control processings. Generally, this processing is repeatedly performed by loop-formation processing, while the computer is

started (S260). Although it is clear from explanation of the above and processing, if less [ cursor size is expanded only while the cursor advance rate is over the rate threshold, and ] than a rate threshold, the cursor of size will usually be displayed again. Therefore, when mouse 8 actuation tends to be stopped, for example, it is going to perform the input from a keyboard, while cursor had been expanded, the problem of being offensive to the eye does not occur. Moreover, in performing fine tab control specification and migration actuation using a mouse 8, it usually moves a mouse 8 slowly. Also in such a case, since it is not expanded, as for cursor, these fine actuation can be performed convenient.

[0031] As already stated, the cursor image data outputted from CPU2 in processing S230 and processing S250 is stored in a frame buffer, and is compounded with other image data. When a video generator displays this compounded image data on CRT display 12, cursor will be displayed on a screen. A display of the image data which had the cursor image data especially generated by processing S250 compounded displays on a screen the cursor on which size is greatly conspicuous from usual. That is, if signal actuation is performed, a user can display cursor greatly on a screen and, thereby, can check the location of cursor by looking easily on a screen. Moreover, if the actuation to which cursor is quickly moved like this operation gestalt is signal actuation, the synergistic effect of improvement in the visibility by motion of cursor and improvement in the visibility by expansion of the cursor size which is the description of this invention will be acquired.

[0032] In addition, although a cursor advance rate may be defined based on 1 time of the amount of displacement of a mouse 8 as mentioned above, the past several times of the continuous amounts of displacement are averaged, and it is good also as a cursor advance rate. Moreover, in the signal detection processing S220, a user's volition of that passing speed having not only exceeded the rate threshold but the thing for which more than predetermined migration length was moved judges on AND conditions, then signal actuation can be checked more clearly, and it is controlled that display emphasis of cursor is performed as incorrect \*\*. moreover -- although passing speed should calculate the value about the actual migration direction correctly, since that accuracy is not made so much into a problem in this cursor display control -- processing S220 -- the velocity component of the direction of X, or one of the velocity components of the direction of Y - - the processing load of CPU2 is mitigable as easy processing of [ one / larger / a rate threshold ]. The signal actuation using the passing speed mentioned above can be similarly applied, when other pointing devices which output the amount of displacement continuously, such as a tracking ball, are used instead of a mouse 8.

[0033] As display emphasis processing S240 of drawing 2 , it is combined with it instead of the [operation gestalt 2] book operation gestalt being expansion of cursor size, and the processing to which the difference of the display brightness of cursor and the brightness around cursor is usually expanded rather than the time is used for it. Since the configuration of the computer of this operation gestalt is the same as that of drawing 1 , explanation is omitted. It is only that, as for the processing flow of this operation gestalt, the concrete contents of the display emphasis processing S240 differ from the above-mentioned operation gestalt, and the flow of the outline of processing is the same as the case of the operation gestalt 1 shown in drawing 2 .

[0034] Hereafter, the display emphasis processing S240 of this operation gestalt is explained. Based on the display position of the cursor for which it asked by processing

S200, the address of the frame buffer corresponding to the pixel of the circumference of it is calculated. And CPU2 reads the image data of the address of this circumference pixel from a frame buffer, and defines the brightness value of the image used as the background of cursor from the maximum or the minimum value of the average of the brightness value of the read circumference pixel, or the brightness value of a circumference pixel, for example. Next, the display brightness of cursor is defined so that the difference of the display brightness and the brightness value of a background of cursor may become larger than the usual condition. For example, let the value which applied the predetermined value to the brightness value of a background be the display brightness of cursor. Moreover, when a background is bright, the value which lengthened the predetermined value conversely may be made into the display brightness of cursor, it is bright in the circumference, and cursor may be displayed darkly and a brightness difference may be emphasized.

[0035] in addition, instead of [ of the display emphasis processing by emphasizing the difference from the "brightness" of the background and cursor which were read from a frame buffer which was mentioned above ] -- or it can combine with it and display emphasis processing by emphasizing the difference in the "color" of a background and cursor can also be performed. It realizes by processing which is set that emphasis of the difference in this color makes the color of cursor the complementary color of a background based on the RGB value of the background read from the frame buffer.

[0036] Moreover, with the above-mentioned operation gestalt, the signal actuation detected by the signal detection processing S220 was actuation in which the passing speed of a mouse 8 exceeds a rate threshold, i.e., quick migration actuation of a mouse 8. However, if this signal actuation is the actuation which a user can perform easily at the time of computer operation, it is fundamentally [ any ] good. However, since that cursor size is expanded has a possibility of giving a user sensibility offensive to the eye except when it is going to grasp a cursor location, if it can do, it will be thought desirable for other user actuation to a computer to be conflicting actuation or the actuation which can be performed by a user distinguishing.

[0037] There is migration actuation of the mouse 8 which produces the predetermined change pattern of the passing speed of cursor as other examples of signal actuation. Specifically, the actuation in which a mouse 8 is shaken and moved to right and left is mentioned. the passing speed of the direction of X reverses the signal detection processing S220 repeatedly to positive/negative -- with, this actuation is detected. In this case, the conditions that passing speed becomes beyond a rate threshold by each stroke may be imposed. This actuation can be similarly applied, when other pointing devices which output the amount of displacement continuously, such as a tracking ball, are used instead of a mouse 8.

[0038]

[Effect of the Invention] According to the cursor display control of this invention, the effectiveness that the visibility of cursor improves is acquired. Since a cursor display is especially emphasized by predetermined signal actuation by the predetermined pointing device operator according to this invention even if a display is high resolution and the magnitude of the cursor at the time is usually a very small case to a screen size, the effectiveness that cursor can be easily found out on a screen is acquired.

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## CLAIMS

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[Claim(s)]

[Claim 1] The cursor display control which carries out [ having a signal detection means is the cursor controller which it asks / cursor controller / for the pointing location on an indicating-equipment screen based on the input from a pointing device, and displays cursor on the pointing location concerned, and detect the predetermined signal actuation performed by the pointing device operator, and a display emphasis processing means will emphasize and display said cursor if said signal actuation is detected, and ] as the description.

[Claim 2] continuous -- a variation rate -- the variation rate concerned from said pointing device which outputs an amount -- the cursor display control according to claim 1 characterized by having a cursor advance rate decision means to ask for the passing speed of said cursor based on an amount, and said signal detection means detecting said signal actuation which used change of said passing speed at least.

[Claim 3] Said signal detection means is a cursor display control according to claim 2 characterized by detecting that said passing speed exceeded the predetermined rate threshold as said signal actuation.

[Claim 4] Said display emphasis processing means is a cursor display control according to claim 1 characterized by expanding the display size of said cursor and performing said emphasis.

[Claim 5] Said display emphasis processing means is a cursor display control according to claim 1 characterized by displaying said cursor with the complementary color of the background color of the cursor concerned, and performing said emphasis.

[Claim 6] Said display emphasis processing means is a cursor display control according to claim 1 characterized by expanding the brightness difference around said cursor and cursor concerned, and performing said emphasis.



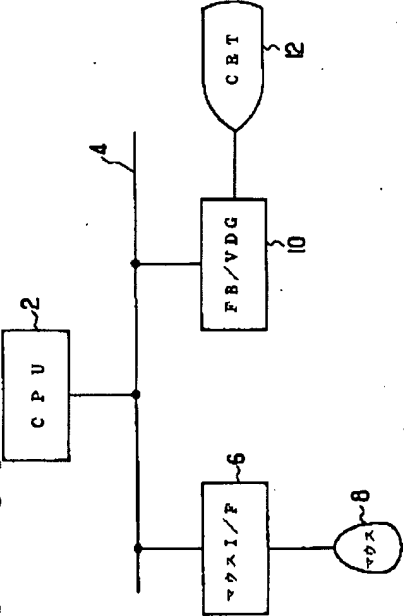
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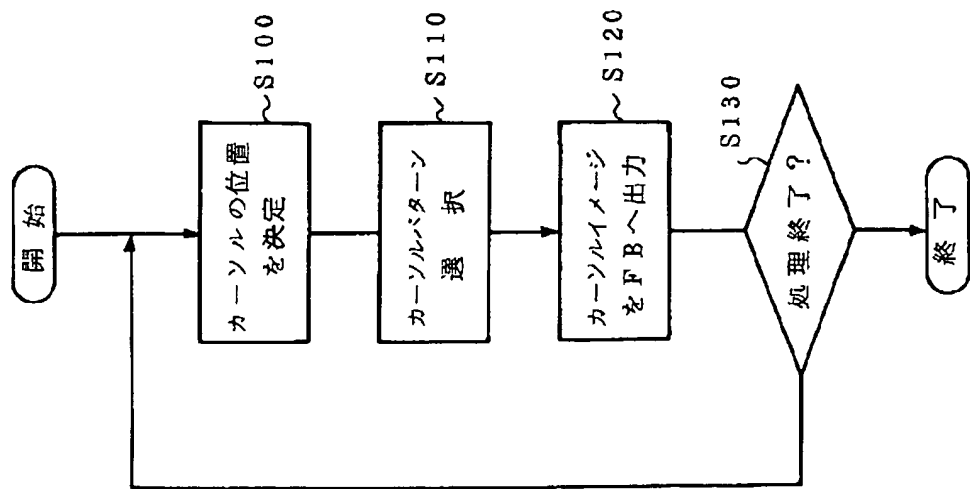
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DRAWINGS

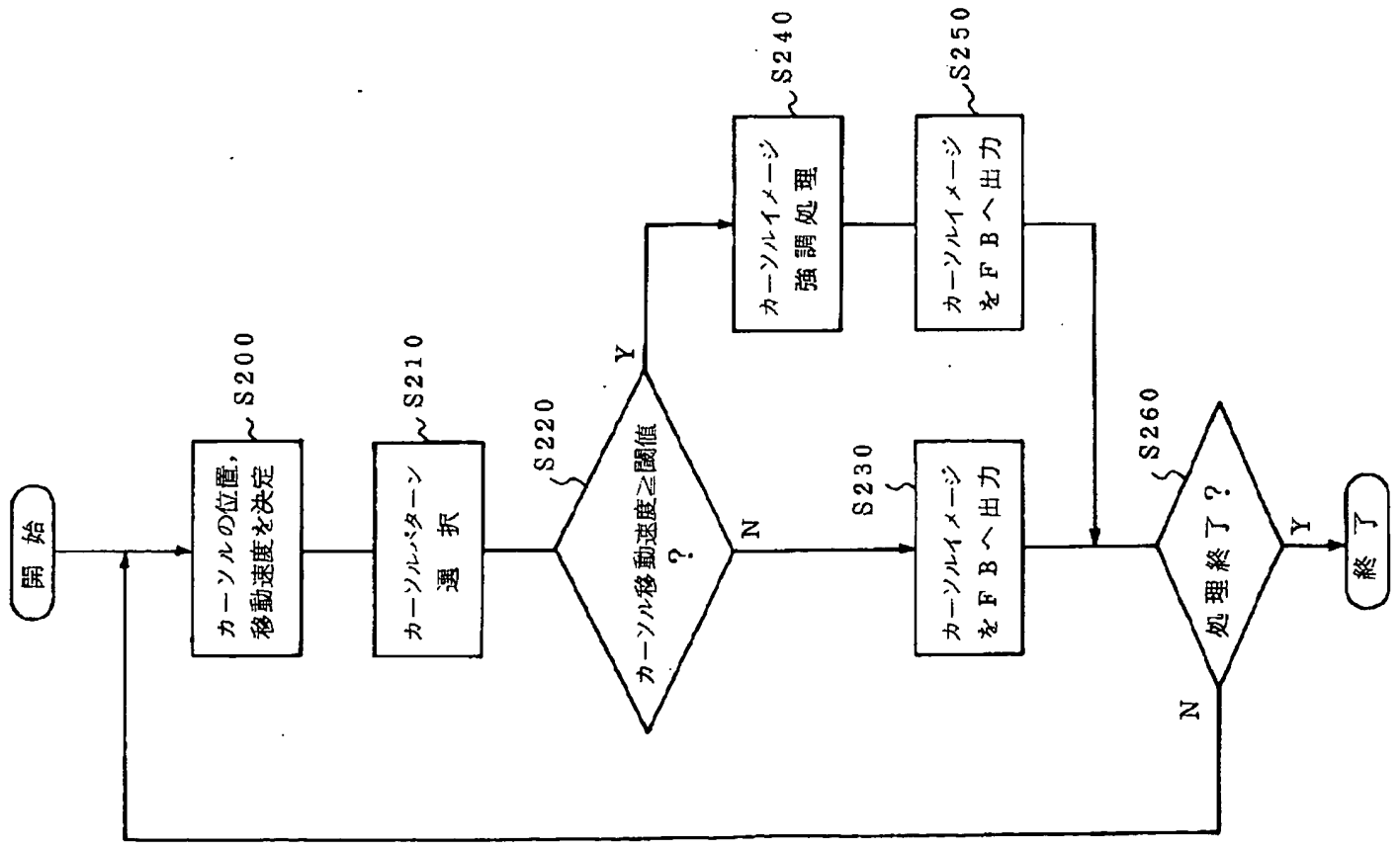
[Drawing 1]



[Drawing 3]



[Drawing 2]



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[Translation done.]